AMENDMENTS TO THE SPECIFICATION

Please amend the specification as indicated below, where brackets indicate deletions and underlining indicates additions.

Please amend the paragraph beginning at 7, line 26, as follows.

Fig. 1A is a schematic view of a surgical environment including an infrared video interface 100 for a head-mounted display, in accordance with the present invention. A user 102, e.g., a surgeon or assistant <u>over a surgical patient 107</u>, wears a headset 104, containing a remote video display device 140 and a remote electronic circuit 142, including ancillary optical, audio, and electronic apparatus, described in more detail below. In some embodiments, all of the receiving, processing, audio, and display functions relating to the head-mounted display are performed within headset 104. Alternatively, some of these functions are performed within an optional utility module 105a attached, for example, to the clothing or belt of user 102, and connected to headset 104 by a utility cable 105b. Batteries 144 configured to power the respective head-mounted display functions can be mounted at headset 104 or optionally at utility module 105a. A remote mobile video bandwidth receiver 146 located, e.g., at headset 104, receives a diffusely reflected infrared signal 118 carrying video and/or audio data on a modulated beam of electromagnetic energy. A modulated infrared signal 106 is transmitted through the atmosphere from an array [108] <u>130</u> of conventional IR LEDs with integral collimating lenses (typically for a +10 degree radiation pattern from each LED) within transceiver module 110, which is connected to a base station 112 by a bundle of cables 182. The lensed LEDs typically create a 2 ft diameter <u>circle</u> on a diffusely

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reflective scattering surface 6 feet away. Alternatively, transceiver module 110 is integral with base station 112. An imaging system (not shown), e.g., an endoscopy video camera, within surgical patient 107 provides a video image via an appropriate communication line 161 to base station 112.

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Please amend the paragraph beginning at 8, line 21 as follows.

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In the embodiment of Fig. 1A, lensed LED array [108] 130 [project] projects modulated IR signal 106 through the atmosphere onto a diffusely reflective target area of the ceiling 116 or a surface (not shown) mounted adjacent ceiling 116. Infrared signal 106 is scattered through the atmosphere from the diffuse target area as diffusely reflected IR signal 118, a portion of which illuminates headset 104. In some embodiments, the diffuse target area (e.g., ceiling 116), provides a substantially cosine (Lambertian) pattern of diffusely reflected IR signal 118. Alternatively, the diffuse target area has a lenticular or other well known surface structure, providing a directionally preferred scattering pattern of scattered infrared signal 118.

Please amend the paragraph beginning at page 18, line 20 as follows.

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Fig. 2E is a more detailed transceiver schematic block diagram, in accordance with a further embodiment of the present invention. Transceiver circuit 110 is connected with base station 112 through a bundle of cables [186] 182, which comprises a video coaxial cable 184 carrying video signals 270, an audio coaxial cable 183 carrying audio signals 151, and power

cables 185 carrying DC electrical power 272. Video signal 270 from video coaxial cable 184 is applied to LED drivers 278, which drives an IR LED array 130. The IR LED array produces an IR beam 132.

a3 cncld

Please amend the paragraph beginning at page 18, line 32 as follows.

The optical components mounted at headset 104 are complementary to those mounted at transceiver module 110. Fig. 3A is a schematic front view of an IR module 300 containing components of IR video interface 100 incorporated in headset 104. Figs. 3B and 3C are top and side schematic views, respectively, of a user wearing an embodiment of headset 104 including IR module 300. <u>In Figs. 3B, 3C, and 1A, the example headset 104 is a surgical eyewear frame including a pair of eyeglasses, and IR module 300 is coupled to a front portion of the frame above the eyeglasses.</u> IR module 300 is mounted away from the user's peripheral vision field and above the LCD and associated display optics (see Hebert, cited above), thereby providing a substantially unobstructed wide angle reception path to the ceiling or to an overhead transmitting LED array.

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Please amend the paragraph beginning at page 19, line 25 as follows.

The optional audio carrier portion is separated from the video via pulse amplitude detector 324 (e.g., sample-and-hold) using reconstructed timing information from headset timing generator [104] <u>334</u>. The recovered audio signal is then applied to a headphone amplifier 326 configured for driving a conventional dynamic headphone speaker element 328.

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Please amend the paragraph beginning at page 21, line 4 as follows.

In an alternative return audio implementation, the return audio signal is digitized with a simple A/D converter within headset 104. It is then formatted, stored and restructured digitally by a PIC controller within timing generator 334 of Fig. 3D as a series of full-amplitude pulses occupying a time slot normally used for a full horizontal line of video; for example, every eighth line. The video normally occupying these lines is then blanked and delayed for IR transmission until the following lines, thereby adding 600/8 or 75 lines to the SVGA format. As with other timing functions, the video blanking and audio pulse formatting is controlled in base station 160 of Fig. 2A by generator 176 and synchronously controlled by headset timing generator 334 in Fig. 3D. Audio information is transmitted as an IR series of pulses in the same way by headset LEDs 306 in Fig. 3A, received by collecting lens and lightcone 252 in [tranceiver] <u>transceiver</u> module 110, and sent through coaxial cable 151 in cable bundle 182 to base station 112,where it is digitally decoded and converted to analog audio for equivalent use. While this digital embodiment has the disadvantage of increasing the video bandwidth by 675 lines/600 lines, or 12.5%, it has the advantage of decreasing headset [LEDs 306] <u>LED 306's</u> power requirements for <u>an</u> equivalent S/N ratio to the pulse amplitude format; thereby extending the operational life of headset batteries 104.

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Please amend the paragraph beginning at page 21, line 27 as follows.

In one embodiment, each cluster 132 consists of five LEDs 131 driven in series from a common modulated electrical source through electronic buffers 133 from a common +12 volt power supply 260 (Figure 2C). The common modulated electrical source is electrical coaxial cable 182, as shown in Figure 2D. Alternatively, the common modulated electrical source is a single coaxial cable 184 in bundle of cables [186] 182, as in Fig. 2E. The clusters 132 of LEDs 131 and their common modulated electronic driver sources 133 are driven in parallel from the common modulated electrical source. This invention encompasses clusters with more than five LEDs and clusters with less than five LEDs. The optimum number of LEDs 131 in the array 130 depends on the desired minimum S/N ratio at the desired maximum range of separation between [tranceiver] transceiver 110 and remote receiver 302. To those skilled in the art, it is generally understood that random noise from silicon detectors such as detector 304 in Fig. 3A is nearly constant, while signal strength generally falls off with the square of the range of separation. Therefore, doubling the number of LEDs 131 in array 130 will generally increase the S/N ratio by the square root of 2, or 44%, at a given range. Typically, the desired S/N ratio is reached at a ratio where an increase in the S/N ratio is no longer noticeable to the eyes of user 102. This is generally in excess of 40 db.

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Please amend the paragraph beginning at page 24, line 12 as follows.

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Figure 5G is a plane view illustrating a prismatic dispersion plate 560. The grooves 562 widen the angular field of vision 510, or collection angle, of the collecting lens assembly. The plate 560 has both vertical 580 and horizontal

582 grooves. Horizontal grooves [580] 582 widen the angular field of vision 510 during heads up-down motion, while vertical grooves [582] 580 widen the angular field of vision 510 in side-to-side head motion. In one embodiment, the prismatic pattern is widened symmetrically with an equal number of horizontal grooves 582 and vertical grooves 580. Alternatively, the angular field of vision 510, or collection angle, is widened asymmetrically with an asymmetrical prismatic pattern. One embodiment has more horizontal grooves 582 than vertical grooves 580 to favor heads up-down motion over side-to-side head motion. Alternatively, side-to-side head motion is favored over heads up-down motion by having more vertical grooves 580 than horizontal grooves 582.

a8 concld

Please amend the paragraph beginning at page 25, line 9 as follows.

Fig. 5I is a graphic representation of the calculated radiative capture by various elements of collecting lens assembly 302, relative to the radiative capture by photodetector 304 absent the other elements of collecting lens assembly 302. Relative radiative capture is shown along the vertical axis, and off-axis angle of incidence relative to symmetry axis 512 is shown along the horizontal axis. The baseline radiative capture of identically 1.0 by unaided photodetector 304 is shown as curve 540. Curve 542 shows the combined relative radiative capture by photodetector 304 and wide-angle collecting lens 518. Curve 544 shows the combined relative radiative capture by photodetector 304, wide-angle collecting lens 518, and inner light cone 514. Curve 546 shows the combined relative radiative capture by entire collecting lens assembly 302, including photodetector 304, wide-angle collecting lens 518, inner light

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cone 514, and outer conic cavity 520. As shown in Fig. [5C] 5I, the radiative capture by complete collecting lens assembly 302 relative to unaided photodetector 304 exceeds a factor of 15 on-axis and approximates a factor of four at a 40-degree angle off-axis. Curve 548 shows the relative radiative capture by the vertical grooves 580 in the prismatic dispersion plate 560. Curve 550 shows the relative radiative capture by the horizontal grooves 582 in the prismatic dispersion plate 560. The prismatic dispersion plate increases off-axis enhancement at the cost of on-axis sensitivity.

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